



## EFFECTS OF YOGA ON CARDIAC HEALTH SLEEP QUALITY, MENTAL HEALTH AND QUALITY OF LIFE OF ELDERLY INDIVIDUALS WITH CHRONIC AILMENTS: A SINGLE ARM PILOT STUDY

Ashwinin Hegde, Kashianth Metri, Promila Chwadhary, Natesh Babu and H R Nagendra  
Division of Yoga and Life Sciences, Swami Vivekananda Yoga Anusandhana Samsthana, Bangalore

Voice of Research  
Volume 6, Issue 1  
June 2017  
ISSN 2277-7733

### Abstract

*There is a high prevalence of chronic health problems in elderly persons which significantly affects their mental health, sleep quality and quality of life (QoL). Practice of yoga known to enhance physical and mental health. Present pilot study intended to evaluate the effects of Integrated Yoga (IY) practice on sleep quality, mental health and QoL of elderly individuals suffering from chronic health condition(s). Twenty-eight elderly persons residents of Bangalore, India (13 males) within the age range 65-80 years (with group mean $\pm$ SD; 68.8 $\pm$ 5.4 yrs) having chronic health problem(s) underwent 1 month of IY, 60 minutes/day for 6 days/week. We excluded the subjects if they; had compromised cardiac functioning; were on sleep medication; underwent abdominal surgery; were on anti-psychotic medications; had exposure to any form of yoga in past one year. All the subjects were assessed for cardiac variables, mental health parameters, sleep quality and quality of life at baseline after one month. It was observed a significant decrease in pulse rate ( $p < .001$ ), respiratory rate ( $p < .001$ ), Systolic BP ( $p = .001$ ), Diastolic BP ( $P < .001$ ), perceived stress ( $p < .001$ ), fasting sugar ( $p < .001$ , -11.97%), anxiety ( $p < .001$ ), depression, ( $p < .001$ ), along with significant improvements in sleep quality ( $p < .001$ ) and quality of life ( $p < .002$ ) after one month of IY intervention compared to baseline.*

**Keywords:** Elderly, Yoga, Quality of life, Sleep, Anxiety, Depression

Ageing is a natural and unavoidable part every living being which is characterized by variety of physical and mental changes. Evidences reported that approximately more than 88% of elderly people suffer from one or more chronic health problems (Hoffman et al, 1996). In a survey report 82% of elderly had one or more chronic health problems and 65% had multiple health problems (Wolff et al, 2002). Osteoarthritis, diabetes, Parkinson's disease, stroke, musculoskeletal disorders, cardiovascular disorders, dementia, etc. are the most common chronic problems reported by elderly (Cathleen et al, 2006; Nanette et al, 1992). Chronic health problems in elderly, often affects the physical, mental, and social life of elderly. It is evident that chronic problem in elderly are strongly associated with to poor sleep quality, impairment of mental health and reduced QoL (Foley, et al, 2004). Presence of chronic health problems in elderly, make them more dependent on care givers; feel lonely, and depressed. Several cross-sectional studies have shown that 9-23% of elderly people having a chronic disorder suffer from depressive disorders (Felton, et al, 2010). Suicide rate among the elderly is almost double compared to general population and 80% of the suicidal cases in elderly known to have depressive syndromes (Conwell et al, 1996). There is strong association of ageing with sleep problems (Haimov et al, 1994). Sleep problem includes the symptoms such as difficulty in falling asleep; waking up; awaking too early; needing to nap; and not feeling rested. A longitudinal study among 9000 elderly persons after three years of follow up, reported a more than 50% of elderly subjects had at least one of the symptoms of sleep problem frequently (Foley et al, 1995). Chronic health problem is considered to be one of the contributing factors for sleep problems in elderly (Foley, 1995). A Longitudinal study has reported the association of sleep problem and increased mortality rate among elderly persons (Pollak et al, 1990).

### Yoga

Yoga is a form of mind-body intervention and a popular alternative and complementary therapy. Scientific evidence recommends the yoga practice in several physical and mental

health conditions (Lin et al, 2011). Several scientific investigations have shown the effectiveness of yoga improving sleep quality (Chen 2009), quality of life (Mareles et al, 2006) and mental health (Bussing, 2012) in various chronic health conditions. Yoga practice shown to be effective in enhancing QoL in several chronic health conditions such as breast cancer, osteoarthritis, chronic low back pain etc. The Yoga is one among the most ancient sciences (Telles, and Naveen, 1997). Practice of yoga by persons suffering from chronic disease shown to improve symptoms and disease progression in many diseases like diabetes, hypertension, Parkinson's disease, multiple sclerosis etc (Alijasir et al, 2010). There are evidences for usefulness of yoga practice in elderly individuals. A randomized controlled trial study showed significant improvement in QoL following three months of yoga intervention in healthy elderly living in old age homes. It improves cardiac autonomic function, cardio respiratory fitness, nerve conduction, and it also improves cognitive functions and psychological health (Tran MD et al, 2001). A significant number of scientific studies proved the safety and efficacy of yoga in an elderly population (Hariprasad et al, 2013). It is proved to be effective in physical, physiological and psychological domains in an elderly population (Gonçalves LC et al, 2011). To the best of our knowledge no previous studies have looked into effects of yoga on mental health, sleep quality and quality of life in elderly with chronic health problems. With this background, this pilot study was planned to see the impact of one yoga practice on physiological parameters, psychological health, sleep and quality of life of elderly people.

### Methodology

**Participants:** We screened 50 elderly persons within age group between 60-80 years, who were residents of local community apartments of south Bangalore, India for study criteria.

**Inclusion criteria and exclusion criteria:** We selected the elderly persons; of any gender; within the age range 60 to 80 years; who did not had exposure to any form of yoga practice in the last one year; who had at least one chronic health condition.



We excluded the subjects if they had; history of recent surgery; any kind psychiatric problems; compromised cardiac functioning; been on psychotic medication or sleep medication.

Procedure: We followed convenient sampling method. Advertisement was carried out through newspapers and flyers in different local nearby apartments in south Bangalore, India. 35 subjects fulfilled eligible criteria among these 4 declined for participation and 3 discounted in the middle of study due to some personal reasons. Finally Twenty-eight elderly (13 males; group average age±SD= 68.8±5.4 yrs) completed the study successfully.

Outcome measures: All the following variables were done at baseline and after one month of yoga intervention.

Cardiac variables- Systolic BP, diastolic BP, heart rate (using Omran BP monitoring system), Fasting blood glucose level using *Glucanorm* glucometer

Psychological variables - Anxiety and depression (using Hospital Anxiety Depression Scale-HADS), Perceived stress (using Cohen's Perceived stress Scale-PSS), Quality of life - Using Quality of life and Life satisfaction scale, Sleep quality (using Pittsburg sleep quality index)

Assessment tools: - Hospital Anxiety Depression Scale (HADS)-Hospital Anxiety Depression Scale Questionnaire: Depressive and anxiety symptoms were measured using this questionnaire. HADS Questionnaire has 14 items, seven items related to anxiety symptoms and seven item related to depressive symptoms. A score greater than or equal to 11 shows that the subjects have a significant number of symptoms of anxiety or depression corresponding to confirm cases (Straat et al, 2013). Perceived stress- Cohen's perceived stress scale (CPSS) (Cohen et al, 1983). It is one of the most frequently used tools for measuring psychological stress. It is a self-reported questionnaire that was designed to measure "the degree to which individuals appraise situations in their lives as stressful" (Rao et al, 2017). Sleep quality- Sleep quality was assessed using Pittsburg sleep quality index. Pittsburg sleep quality index: is an effective instrument useful for measuring subjective sleep quality and sleep disturbances in older people. A score of five and above indicated clinically significant sleep disturbances. Numerous studies using the PSQI in a variety of the older adult population internationally have supported high validity and reliability (Carole et al, 2012). Quality of Life Quality of Life Enjoyment and Satisfaction Questionnaire- This is one of the most widely used instruments to assess psychological distress. The Q-LES-Q is a self-report instrument designed to measure satisfaction and enjoyment in various domains of functions like physical health, work, household duties etc. (Lee et al., 2014).

Intervention: All the subjects underwent one month of yoga practice (detailed in table 1). The practices included in the module were chosen from the interventions in previous studies. Daily Yoga session was consisted of loosening practices, yoga postures-asanas breathing practices-pranayama, yogic relaxation techniques and meditation-dhyana. Yoga session was total 60 minutes every day from 6am -7am, 6 days

a week for 1 month.

**Analysis:** Scoring of all self reported questionnaires were done following the instructions mentioned in the manual of the respective questionnaire. Data was analyzed using SPSS version 10. Paired sample t test and Wilcoxon's signed rank test were used assess prepost changes.

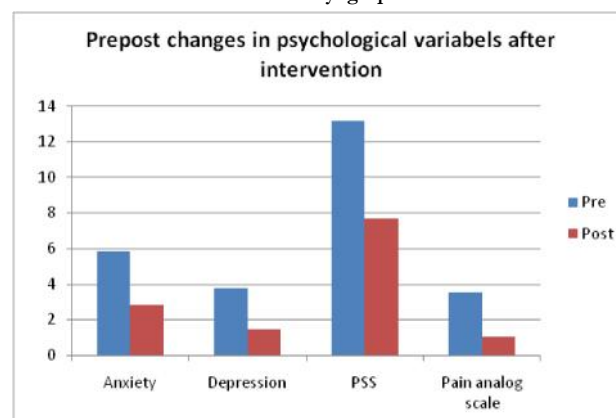
**Results:** Cardiac variables: There was significant decrease in pulse rate (p<.001-6.44%), respiratory rate from (p<.001,-19.23%), Systolic BP (p<.001, -8.57%), Diastolic BP (p<.001,-6.58%), Fasting Sugar (p<.001,-11.97%) in post intervention assessments compared to baseline.

Psychological variables : We observed a significant reduction in perceived Stress (p<.001,-41.73%), anxiety (p<.001,-51.83%), depression (p<.001,-60.95%), along with a significant improvement in sleep quality (p<.001,-55.56%), QoL (p<0.001, 14.96), life satisfaction (p=.002, 11.30%) in post intervention compared to baseline.

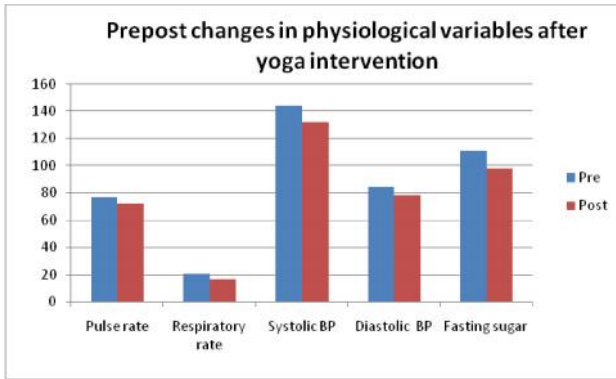
**Table1 - Shows Pre-post changes in all variables after one month of yoga practice**

| SL No | Variables           | Pre [Mean ± SD] | Post [Mean ± SD] | % Change | df | P values  |
|-------|---------------------|-----------------|------------------|----------|----|-----------|
| 1     | Pulse rate          | 77.11 ±7.05     | 72.14 ± 6.20     | -6.44    | 27 | <.001***  |
| 2     | Respiratory rate    | 20.43 ± 4.26    | 16.50 ± 4.56     | -19.23   | 27 | <.001***  |
| 4     | Systolic BP         | 144.18 ± 19.49  | 131.82 ± 17.35   | -8.57    | 27 | =0.001**a |
| 5     | Diastolic BP        | 84.07 ± 9.97    | 78.54 ± 7.98     | -6.58    | 27 | <.001***  |
| 6     | Fasting sugar       | 111.04 ± 19.45  | 97.75 ± 14.09    | -11.97   | 27 | <.001***b |
| 7     | Anxiety             | 5.86 ± 3.76     | 2.82 ± 2.40      | -51.83   | 27 | <.001***b |
| 8     | Depression          | 3.75 ± 3.38     | 1.46 ± 1.53      | -60.95   | 27 | <.001***b |
| 9     | Sleep quality index | 6.43 ± 3.66     | 2.86 ± 1.86      | -55.56   | 27 | <.001***b |
| 10    | PSS                 | 13.18 ± 5.19    | 7.68 ± 3.79      | -41.73   | 27 | <.001***a |
| 11    | Pain analog scale   | 3.50 ± 3.11     | 1.07 ± 1.49      | -69.39   | 27 | <.001***b |
| 12    | Quality of life     | 73.54± 10.54    | 84.54 ± 8.78     | 14.96    | 27 | <.001***a |
| 14    | Satisfaction scores | 4.11± 0.74      | 4.57± 0.50       | 11.30    | 27 | =.002**b  |

**Graph 1 - Pre-post changes in all physiological variables after one month of yoga practice**



Graph 2 - Pre-post changes in all psychological variables after one month of yoga practice



Graph 3 - Pre-post changes in all sleep quality after one month of yoga practice



**Discussion:** This study intended to evaluate the effect of one month yoga practice on cardiac variables, sleep quality, mental health and QoL of elderly persons suffering from chronic health problems. We observed a significant improvement in cardio-respiratory fitness parameters (by improved heart rate, systolic BP, diastolic BP and respiratory rate), mental health (reduction in perceived stress, anxiety and depression), sleep quality (by Pittsburgh’s sleep quality Index- PSQI) and QoL after one month of yoga intervention compared to baseline. These results are supported by various earlier studies done in the same population. Previously a study by Bowmen (1997)<sup>1</sup> assessed effect of 6 weeks of yoga training on heart rate and blood pressure in healthy elderly people. There was a significant decrease in heart rate and no significant change was reported in systolic blood pressure. In the present study we observed significant decrease in heart and systolic and diastolic BP following 4 weeks of yoga intervention this difference in the results of these two studies could be difference in the forms of yoga. Another study by Kuei-Min Chen (2009), studied the effects of six months silver yoga practice on sleep quality, depression, and self-perception of health status of 62 community dwelling elderly and compared it with control group (n=62). This study reported a significant improvement in mental health components, sleep quality and quality of life. Similarly, results of our study are in supports of previous study results. However duration and form of yoga, used and

subjects in both the study are different. In our study we found significant improvement in one month of integrated yoga intervention however our study was single group prepost design. In randomized controlled trial by Hariprasad (2013) assessed the effect of six month yoga intervention on sleep quality and QoL in elderly people living in old age homes. In this study significant improvement in sleep quality and environmental domain of QoL was observed in yoga group and no improvement was noticed in control group. Similarly in results of present study is supported by previous study (Hariprasad et al, 2013). However subjects in our study were elderly persons had chronic health problems and were living with their family also duration of the yoga intervention was one month, whereas in previous study (Hariprasad et al, 2013) elderly persons were health subjects, living in old-age homes and duration of yoga intervention was six month. Our study reported a significant improvement in sleep and QoL even with such short term intervention as compared to previous study (Hariprasad et al, 2013) the reason could be subjects with type of yoga practice and subjects with chronic health problems are more sensitive to such interventions compared to control group. Goncalvas (2011) assessed effect of 14 weeks yoga intervention (twice weekly) on flexibility and QoL these results support the findings of the resent study. This study reported significant improvement QoL. In the present study we also found significant improvement in QoL following one month yoga intervention. Previously, Manjunath and Telles, 2005, assessed the effects of yoga and Ayurveda combined therapy on sleep quality and quality of life in geriatric population in this they found significant improvement in sleep quality. Similarly in our study also we observed significant improvement in sleep quality.

**Mechanism**

Possible mechanism behind these findings could be; Practice of Yoga is known to reduce sympathetic tone (Sengupta et al, 2012) through down regulation of the hypothalamus-pituitary- adrenal axis and enhances the deep physical and psychological rest 33, which helps in reducing the heart rate and blood pressure 34 practice of yoga improves the physical activity 35 (Field et al., 2013), psychological wellbeing 36. Different kinds of yogic relaxation techniques 37, different types of yogic breathing practices might have helped them to reduce anxiety 38. This study is having few limitations such as 1) Lack of control group 2) small sample sizes

**Conclusion**

This pilot study suggests a potential role of yoga practice in improving sleep quality, mental health and QoL of elderly individuals with chronic ailments. However, further randomized controlled studies need to be performed to confirm the present findings.

Conflict of Interest: None



## References

- Aljasir, B., Bryson, M., & Al-shehri, B. (2010). Yoga practice for the management of type II diabetes mellitus in adults: a systematic review. *Evidence-Based Complementary and Alternative Medicine*, 7(4), 399-408.
- Bowman, A. J., Clayton, R. H., Murray, A., Reed, J. W., Subhan, M. M. F., & Ford, G. A. (1997). Effects of aerobic exercise training and yoga on the baroreflex in healthy elderly persons. *European journal of clinical investigation*, 27(5), 443-449.
- Büssing, A., Michalsen, A., Khalsa, S. B. S., Telles, S., & Sherman, K. J. (2012). Effects of yoga on mental and physical health: a short summary of reviews. *Evidence-Based Complementary and Alternative Medicine*, 2012.
- Carole SMYTH ,2012, The Pittsburgh Sleep Quality Index (PSQI), General Assessment Series from The Hartford Institute for Geriatric Nursing, New York University, College of Nursing, Issue Number 6.1, Available online at www.hartfordign.org
- Catherine Woodyard. Exploring the therapeutic effects of yoga and its ability to increase quality of life. *Int J Yoga*. 2011 Jul-Dec; 4(2): 49–54.
- Cathleen S. Colón-Emeric and Kenneth G. Saag, 2006, Osteoporotic fractures in older adults, *Best Pract Res Clin Rheumatol*. 2006 Aug; 20(4): 695–706.
- Chen, K. M., Chen, M. H., Chao, H. C., Hung, H. M., Lin, H. S., & Li, C. H. (2009). Sleep quality, depression state, and health status of older adults after silver yoga exercises: cluster randomized trial. *International journal of nursing studies*, 46(2), 154-163.
- Conwell Y, Duberstein PR, Herrmann JH, Caine ED. (1996) Relationship of age and axis I diagnoses in victims of completed suicide: a psychological autopsy study. *Am J Psychiatry*; 153: 1001–08
- Dhansoia, V., Bhargav, H., & Metri, K. (2015). Immediate effect of mind sound resonance technique on state anxiety and cognitive functions in patients suffering from generalized anxiety disorder: A self-controlled pilot study. *International journal of yoga*, 8(1), 70-73.
- Dhar HL. Emerging geriatric challenge. *J Assoc Physicians India* 2005;53:867-72
- Felton, B. J., Revenson, T. A., & Hinrichsen, G. A. (1984). Stress and coping in the explanation of psychological adjustment among chronically ill adults. *Social science & medicine*, 18(10), 889-898.. 9 (Susan K. Roepke\* & Sonia Ancoli-Israel2010)
- Field, T., Diego, M., Delgado, J., & Medina, L. (2013). Yoga and social support reduce prenatal depression, anxiety and cortisol. *Journal of bodywork and movement therapies*, 17(4), 397-403.
- Foley, D. J., Monjan, A. A., Brown, S. L., & Simonsick, E. M. (1995). Sleep complaints among elderly persons: an epidemiologic study of three communities. *Sleep: Journal of Sleep Research & Sleep Medicine*.
- Foley, D., Ancoli-Israel, S., Britz, P., & Walsh, J. (2004). Sleep disturbances and chronic disease in older adults: results of the 2003 National Sleep Foundation Sleep in America Survey. *Journal of psychosomatic research*, 56(5), 497-502.
- Gonçalves LC, de Souza Vale RG, Barata NJ, Varejão RV, Dantas EH. Flexibility, functional autonomy and quality of life (QoL) in elderly yoga practitioners. *Archives of gerontology and geriatrics*. 2011 Oct 31;53(2):158-62.
- Haimov, I., Laudon, M., Zisapel, N., Souroujon, M., Nof, D., Shlitner, A., ... & Lavie, P. (1994). Sleep disorders and melatonin rhythms in elderly people. *Bmj*, 309(6948), 167.
- Hariprasad, V. R., Sivakumar, P. T., Koparde, V., Varambally, S., Thirthalli, J., Varghese, M., ... & Gangadhar, B. N. (2013). Effects of yoga intervention on sleep and quality-of-life in elderly: A randomized controlled trial. *Indian journal of psychiatry*, 55(7), 364.
- Hariprasad, V. R., Sivakumar, P. T., Koparde, V., Varambally, S., Thirthalli, J., Varghese, M., ... & Gangadhar, B. N. (2013). Effects of yoga intervention on sleep and quality-of-life in elderly: A randomized controlled trial. *Indian journal of psychiatry*, 55(7), 364.
- Hoffman, C., Rice, D., & Sung, H. Y. (1996). Persons with chronic conditions: their prevalence and costs. *Jama*, 276(18), 1473-1479.
- Hornick T, Aron DC, 2008: Managing diabetes in the elderly: go easy, individualize. *Cleve Clin J Med* ; 75;(1.);70-8.
- José Luís Pais-Ribeiro a,c, Mark P. Jensen. Validity of four pain intensity rating scales Maria Alexandra Ferreira-Valente. *PAIN\_ 152* (2011) 2399–2404
- Koparde V. Short term effects of yoga therapy in elderly (MD Thesis). Bangalore, India: National Institute of Mental Health and Neurosciences (NIMHANS); 2011
- Kowal, P., Chatterji, S., Naidoo, N., Biritwum, R., Fan, W., Ridaura, R. L., ... & Snodgrass, J. J. (2012). Data resource profile: the World Health Organization Study on global AGEing and adult health (SAGE). *International journal of epidemiology*, 41(6), 1639-1649.
- Lee, Y. T., Liu, S. I., Huang, H. C., Sun, F. J., Huang, C. R., & Yeung, A. (2014). Validity and reliability of the Chinese version of the Short Form of Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q-SF). *Quality of Life Research*, 23, 907–916.
- Lin, K. Y., Hu, Y. T., Chang, K. J., Lin, H. F., & Tsauo, J. Y. (2011). Effects of yoga on psychological health, quality of life, and physical health of patients with cancer: a meta-analysis. *Evidence-Based Complementary and Alternative*

- Medicine*, 2011.
- Manjunath, N. K., & Telles, S. (2005). Influence of Yoga & Ayurveda on self-rated sleep in a geriatric population. *Indian Journal of Medical Research*, 121(5), 683.
- Mereles, D., Ehlken, N., Kreuzer, S., Ghofrani, S., Hoepfer, M. M., Halank, M., ... & Holzappel, N. (2006). Exercise and respiratory training improve exercise capacity and quality of life in patients with severe chronic pulmonary hypertension. *Circulation*, 114(14), 1482-1489.
- Nanette K. Wenger, October 1992, Cardiovascular disease in the elderly, Current problems in Cardiology, Volume 17, Issue 10, Pages 615–690
- Narendran, S., Nagarathna, R., Narendran, V., Gunasheela, S., & Nagendra, H. R. R. (2005). Efficacy of yoga on pregnancy outcome. *Journal of Alternative & Complementary Medicine*, 11(2), 237-244.
- Newberg, A. B., Wintering, N., Khalsa, D. S., Roggenkamp, H., & Waldman, M. R. (2010). Meditation effects on cognitive function and cerebral blood flow in subjects with memory loss: a preliminary study. *Journal of Alzheimer's Disease*, 20(2), 517-526.
- Oken, B. S., Zajdel, D., Kishiyama, S., Flegal, K., Dehen, C., Haas, M., ... & Leyva, J. (2006). Randomized, controlled, six-month trial of yoga in healthy seniors: effects on cognition and quality of life. *Alternative therapies in health and medicine*, 12(1), 40.
- Panjwani, U., Gupta, H. L., Singh, S. H., Selvamurthy, W., & Rai, U. C. (1995). Effect of Sahaja yoga practice on stress management in patients of epilepsy. *Indian journal of physiology and pharmacology*, 39, 111-111.
- Park, H. S., Kim, Y. J., & Kim, Y. H. (2002). The effect of yoga program on reduced blood pressure in elderly's essential hypertension. *Journal of Korean academy of nursing*, 32(5), 633-642.
- Ullal, A., Parmar, G. M., & Chauhan, P. H. (2013). Comparison of glucometers used in hospitals and in outpatient settings with the laboratory reference method in a tertiary care hospital in Mumbai. *Indian journal of endocrinology and metabolism*, 17(9), 688.
- Pollak, C. P., Perlick, D., Linsner, J. P., Wenston, J., & Hsieh, F. (1990). Sleep problems in the community elderly as predictors of death and nursing home placement. *Journal of community health*, 15(2), 123-135.
- Pratap V (1969). Difference in magnitude of response to yogic and non yogic conditions: A synopsis of an exploratory study. *Yoga Mimamsa*; 12:9-18
- Rao, M., Metri, K. G., Raghuram, N., & Hongasandra, N. R. (2017). Effects of Mind Sound Resonance Technique (Yogic Relaxation) on Psychological States, Sleep Quality, and Cognitive Functions in Female Teachers: A Randomized, Controlled Trial. *Advances in mind-body medicine*, 31(1), 4.
- Santaella, D. F., Devesa, C. R., Rojo, M. R., Amato, M. B., Drager, L. F., Casali, K. R., ... & Lorenzi-Filho, G. (2011). Yoga respiratory training improves respiratory function and cardiac sympathovagal balance in elderly subjects: a randomised controlled trial. *BMJ open*, bmjopen-2011.
- Sengupta, P. (2012). Health impacts of yoga and pranayama: A state-of-the-art review. *International journal of preventive medicine*, 3(7).
- Straat, J. H., Van der Ark, L. A., & Sijtsma, K. (2013). Methodological artifacts in dimensionality assessment of the Hospital Anxiety and Depression Scale (HADS). *Journal*
- Telles, S., & Naveen, K. V. (1997). Yoga for rehabilitation: an overview. *Indian Journal of Medical Sciences*, 51(4), 123–127.
- Tran, M. D., Holly, R. G., Lashbrook, J., & Amsterdam, E. A. (2001). Effects of Hatha yoga practice on the health related aspects of physical fitness. *Preventive cardiology*, 4(4), 165-170.
- Uebelacker, L. A., Epstein-Lubow, G., Gaudio, B. A., Tremont, G., Battle, C. L., & Miller, I. W. (2010). Hatha yoga for depression: critical review of the evidence for efficacy, plausible mechanisms of action, and directions for future research. *Journal of Psychiatric Practice*, 16(1), 22-33.
- Vaishali, K., Kumar, K. V., Adhikari, P., & UnniKrishnan, B. (2012). Effects of YogaBased Program on glycosylated hemoglobin level serum lipid profile in community dwelling elderly subjects with chronic type 2 diabetes mellitus—a randomized controlled trial. *Physical & Occupational Therapy in Geriatrics*, 30(1), 22-30.
- Vestergaard-Poulsen, P., van Beek, M., Skewes, J., Bjarkam, C. R., Stubberup, M., Bertelsen, J., & Roepstorff, A. (2009). Long-term meditation is associated with increased gray matter density in the brain stem. *Neuroreport*, 20(2), 170-174.
- Vestergaard-Poulsen, P., van Beek, M., Skewes, J., Bjarkam, C. R., Stubberup, M., Bertelsen, J., & Roepstorff, A. (2009). Long-term meditation is associated with increased gray matter density in the brain stem. *Neuroreport*, 20(2), 170-174.
- Wang, J., Xiong, X., & Liu, W. (2013). Yoga for essential hypertension: a systematic review. *PLoS one*, 8(10), e76357.
- Wolff, J. L., Starfield, B., & Anderson, G. (2002). Prevalence, expenditures, and complications of multiple chronic conditions in the elderly. *Archives of internal medicine*, 162(20), 2269-2276.
- Wolff, M., Sundquist, K., Lönn, S. L., & Midlöv, P. (2013). Impact of yoga on blood pressure and quality of life in patients with hypertension—a controlled trial in primary care, matched for systolic blood pressure. *BMC cardiovascular disorders*, 13(1), 111.